

What is claimed is:

1. A process for detecting optic disc deformation comprising:
obtaining a stereo image pair of an optic disc;
preprocessing the stereo image pair;
registering the stereo image pair;
extracting features from the stereo image pair;
finding coarse to fine disparities within the stereo image pair; and
obtaining a three dimensional representation of the optic disc.
2. The process for detecting optic disc deformation of claim 1 wherein:
obtaining a stereo image pair of an optic disc comprises obtaining the stereo image pair using a non-convergent imaging system.
3. The process for detecting optic disc deformation of claim 1 wherein:
pre-processing the stereo image pair comprises vertically registering the stereo pair;
dividing each of the images of the stereo pair into windows;
finding disparities by using a combination of the power cepstrum of the sum of corresponding windows of the stereo pair;
and cross-correlating the pixel values for both corresponding windows of the stereo pair.
4. The process for detecting optic disc deformation of claim 3 wherein vertically registering the stereo pair comprises:
finding the coarse to fine disparity between the stereo pair by computing the power cepstrum and cross-correlation for corresponding windows of the stereo pair.
5. The process for detecting optic disc deformation of claim 3 wherein vertically registering the stereo pair comprises:

calculating the frequency spectrum of each of the corresponding windows of the stereo pair

6. The process for detecting optic disc deformation of claim 1 wherein:
obtaining a three dimensional representation of the optic disc comprises obtaining a three dimensional representation of cupping of the optical disc.

7. A process for generating a three dimensional measure of optic disc deformation comprising:

- obtaining a stereo image pair of an Optic Nerve Head (ONH);
- identifying landmarks in each image of the stereo image pair;
- identifying the disparity associated with depth of the stereo image;
- aligning the images;
- extracting binary features from the stereo images;
- registering the stereo images in the vertical axis;
- finding coarse to fine disparities of selected regions;
- identifying the disparity for the finest (highest resolution) window resulting in

thereby creating a sparse disparity matrix;

- smoothing the sparse disparity matrix using a cubic B-spline interpolation; and
- superimposing the landmarks in the original stereo image pair image in the a 3-D representation of the Optical Nerve Head.

8. The process for generating a three dimensional measure of optic disc deformation of claim 7 wherein:

- identifying the disparity associated with depth of the stereo image comprises triangulating corresponding points in the stereo image.

9. The process for generating a three dimensional measure of optic disc deformation of claim 7 wherein:

aligning the images comprises employing image matching strategies.

10. The process for generating a three dimensional measure of optic disc deformation of claim 7 wherein:

finding coarse to fine disparities of selected regions comprises computing a combination of the power cepstrum of the sum of corresponding windows and cross-correlation along a range of pixels.